

Smoke Effects Mitigation and Public Health Protection Procedures

At the April 2007 meeting, the Alaska Wildland Fire Coordinating Group (AWFCG) approved the Smoke Effects Mitigation and Public Health Protection Procedures. These Procedures were first implemented during the 2005 fire season and were developed to promote a proactive assessment and documentation of potential smoke impacts; the AWFCG continued to apply the same criteria during the 2006 fire season. For 2007, the name has been changed from ‘Smoke Effects Mitigation and Public Health Protection Proposal’ to ‘Smoke Effects Mitigation and Public Health Protection Procedures.’

Wildland fire smoke in Alaska is inevitable. Public outreach efforts are essential to keep the public informed and provide ample opportunity for individuals to take action based on individual health factors. Land managers, the Alaska Department of Environmental Conservation (ADEC), and suppression providers share the task of providing pro-active and adequate public information on wildfire smoke before, during and after wildland fires occur. Examples of how land managers, ADEC, and suppression providers provide public information about wildland fire smoke include:

1. Incorporating information about health effects of smoke and potential for smoke from wildfires in FIREWISE-type newspaper notices.
2. Working with local communities to incorporate information about health effects of smoke and what should be done about it into FIREWISE and other public fire prevention activities. Refer to the website <http://www.epi.hss.state.ak.us/wildfire/default.htm> for “Wildfire Smoke - a Guide for Public Health Officials” and links to other publications for public education guidelines.
3. Incorporating within communications to the public the role of fire, its importance in Alaska, the inevitability of smoke impacts in the short term, and the long-term ecosystem benefits.
4. Using Fire Information Officers to disseminate information on smoke health effects during wildfires.
5. Identifying sensitive smoke receptors before the fire season (i.e. communities, villages, recreational areas, tour industry, public highways, hospitals, schools, groups at higher risk for smoke related problems, etc) and target them for dissemination of special information on how to prepare for and deal with smoke when it occurs.
6. Pre-planning public health mitigation scenarios, ranging from increased public education during the incident to providing respite from smoke during a smoke event.

Besides the need for public information, there is a need to disseminate important smoke-related information among the land management agencies, ADEC, and suppression service providers before, during and after wildfire incidents. This is facilitated by:

1. Predictive Services incorporating smoke concerns and forecasts as a routine subject into suppression service providers and land managers briefings during wildfire activity to assist with operational and land manager assessments and decisions.
2. Suppression service providers including information on smoke impact potential or smoke conditions on the Fire Notification and Fire surveillance reports given to land managers.
3. Land managers providing ADEC and suppression service providers with information on smoke impacts obtained during their surveillance/monitoring activities, requests for smoke monitoring at specific-locations and land management concerns or decisions that affect smoke management.
4. Suppression and land manager FMOs, Predictive Services personnel and the ADEC meteorologist routinely tracking smoke plume locations and smoke distribution using satellite imagery.
5. ADEC broadcasting smoke advisories to assist Alaska Multi-Agency Coordinating (MAC) Group, suppression providers and land managers with decisions related to smoke.

Each AWFCG member is responsible to implement these educational and informational procedures within their agencies as appropriate. These smoke mitigation procedures must remain flexible to respond to the changing needs and priorities of land managers, ADEC and suppression service providers. An analysis on the effectiveness of implementing these measures will be included in the annual AWFCG fall fire program review. Proposed changes to the threshold criteria will be documented at that meeting and will be relayed to the AWFCG Smoke Management Committee, who will change the procedures, if necessary. Changes will be approved by the AWFCG and implemented by AWFCG members within their agencies the following fire season. In this way, the threshold criteria will be adopted for a period of one year and will be available for revision on an annual basis. It is the responsibility of each AWFCG member to distribute and provide operational direction within their agencies. The threshold criteria are intended to provide minimum uniform requirements for interagency use; they do not preclude more restrictive agency-specific measures nor should they discourage an assessment of any fire of any size at any time that may have potential impacts on a community. It is not the intent of the following threshold criteria to

constrict the use of fire as a management tool or to produce an unreasonable workload; it is the intent to facilitate and document (on forms already in use) an acceptable interagency systematic review of smoke impacts and furnish the public with appropriate air quality information. Examples of the range of actions that may be implemented as a result of an assessment include indirect attack on an ongoing fire to inhibit fire growth to suppression of new starts within a defined geographic area. An assessment may also clearly indicate that no action is necessary.

The following three threshold criteria based on air quality impacts have been approved for **assessments, documentation and management actions** for wildland fires that are allowed to burn under the influence of natural forces and where the cost of suppression may exceed the value of the resources to be protected, the environmental impacts of fire suppression activities may have more negative impacts on the resources than the effects of the fire, or the exclusion of fire may be detrimental to the fire dependent ecosystem i.e. Limited and Modified (post conversion) Fire Management Option areas. Air quality impacts are not immediately addressed for fires occurring in Critical, Full and Modified (pre-conversion) Fire Management Option areas since, under the standard operating procedures, actions to suppress the fires in those areas are implemented by the suppression service providers upon discovery of the fire. If initial response forces do not contain a fire in one of these management option areas, a WFSA is required; the WFSA includes an analysis of smoke impact and conditions.

Assessments are the responsibility of both the land manager and suppression organizations. ADEC provides the technical expertise for addressing air quality and health related issues. Additional information on air quality is available on the ADEC website at <http://www.dec.state.ak.us/air/>.

ADEC confirms that visibility is a good indication of air quality. Air quality categories can be estimated using the visibility ranges in the Air Quality Guidelines table on page 5. As air quality problems develop portable air quality monitors may be used to better measure particulate matter (PM2.5). When monitoring equipment readings are available, they will be used to determine if threshold criteria are met; the AWFCG will determine location priorities for monitoring when the situation warrants.

Threshold Criteria 1 *Minimal Impacts:*

Smoke concerns are generally few. Smoke will only be produced for a short period of time or is barely visible to the public. Smoke amounts are not expected to reach “*unhealthy*” levels. Members of the public have expressed few or no concerns about smoke. No impacts or minor impacts to isolated residences, remote roads or other facilities may occur.

Assessment: Upon discovery of a fire, suppression agencies and land managers make an initial assessment of potential impacts. When fires are first discovered, suppression agencies document pertinent fire information including potential smoke impacts on the Fire Notification Form. Those forms are forwarded to land managers. Fire activity and potential impacts including those related to smoke for ongoing fires is documented on fire surveillance reports. This information is summarized and submitted by Zone/Area Dispatch Offices to the Alaska Interagency Coordination Center (AICC) and incorporated daily into the AICC Situation Report. Land managers may use other assessment tools such as spot forecasts, satellite imagery, local knowledge, websites, monitoring data, Rare Event Risk Assessment Process (RERAP), etc. to further assess potential impacts. Land Managers will consider the potential consequences of the fire on air quality and the impact of smoke on the public when making fire management decisions. The land manager will also consider the cumulative effects of the fire within the context of other fires burning within the same watershed (hydrologic unit (HUC)). The assessments/decisions are documented on one of the forms listed below.

Management Action and Responsibility: If the Fire Notification Form, the fire surveillance report or land manager’s assessment indicates no potential impacts to a community or sensitive area, the fire is managed in accordance with the predetermined fire management option. If the Fire Notification Form, fire surveillance report and/or the land manager’s assessment indicate that there are potential impacts to a community or sensitive area, the land manager in consultation with the Suppression FMO will determine the appropriate management response based on the best available information, including Threshold Criteria level. Smoke management issues and potential smoke impacts must be considered if a Decision Criteria Record implements a fire management response different from the predetermined fire management option. If a fire requires a WFSA or the fire is to be managed under a WFIP, potential consequences of the smoke on air quality and the impact of smoke on the public will be considered in developing management alternatives as required in both processes.

Assessments and/or alternatives chosen should be reviewed and validated routinely throughout the duration of the fire to ensure that smoke mitigation actions are implemented on a timely basis, if required.

Documentation: The suppression provider and land manager will document the assessments/decisions on one of the following:

1. Fire Notification Form (new starts)
2. Fire Surveillance Report (ongoing fires)
3. Decision Criteria Record (Alaska Interagency Wildland Fire Management Plan Appendix E)
4. Wildland Fire Implementation Plan (WFIP)
5. Wildland Fire Situation Analysis (WFSA).

Threshold Criteria 2 Localized Impacts:

Smoke concerns are moderate, although some concerns may require special mitigation. Smoke will be visible to the public over several days. Smoke exposures or amounts at the “*unhealthy*” level may cause health or safety concerns over a short period of time. Vistas, roads, and some residences may experience short-term decreases in visibility. Members of the public have expressed concerns about smoke. A few health related complaints may occur. Smoke intrusions may occur into smoke sensitive areas. Mitigation measures or additional smoke modeling may be needed to address potential concerns with smoke impacts. Specific smoke monitoring may be required to determine smoke plume heights and directions.

Assessment: Upon discovery of a fire, suppression agencies and land managers make an initial assessment of potential impacts. When fires are first discovered, suppression agencies document pertinent fire information including potential smoke impacts on the Fire Notification Form. Those forms are forwarded to land managers. Fire activity and potential impacts including those related to smoke for ongoing fires is documented on fire surveillance reports. This information is summarized and submitted by Zone/Area Dispatch Offices to the Alaska Interagency Coordination Center (AICC) and incorporated daily into the AICC Situation Report. “*Unhealthy*” air levels detected in a community and projected to continue or degrade further will prompt assessments by land managers. Examples of additional reference materials available to estimate the potential impacts from that fire and its affect a community’s air quality include spot forecasts, satellite imagery, local knowledge, websites, monitoring data, and RERAP. Land Managers will consider the potential consequences of the fire on air quality and the impact of smoke on the public when making fire management decisions. The land manager will also consider the cumulative effects of the fire within the context of other fires burning within the same HUC. The decisions based on these assessments of mitigation alternatives and impacts are documented on one of the forms listed below. The assessment must be completed and documented within 72 hours from detection of “*unhealthy*” conditions.

Management Action and Responsibility: If the Fire Notification Form, Fire surveillance report and/or the land manager’s assessment indicates **no potential** impacts to a community, sensitive area, or localized area, the fire is managed in accordance with the predetermined fire management option. If the Fire Notification Form, fire surveillance report and/or the land manager’s assessment indicate **potential** impacts to a community, sensitive area, or localized area where “*unhealthy*” smoke impacts exist and are projected to continue, the land manager(s) in consultation with the Suppression FMO will determine the appropriate management response based on the best available information, including Threshold Criteria level. Existing localized smoke management issues and potential smoke impacts must be considered if a Decision Criteria Record implements a fire management response different from the predetermined fire management option. If a fire requires a WFSA or the fire is to be managed under a WFIP, potential consequences of the smoke on air quality and the impact of smoke on the public will be considered in developing management alternatives as required in both processes.

Assessments and/or alternatives chosen should be reviewed and validated routinely throughout the duration of the fire to ensure that smoke mitigation actions are implemented on a timely basis, if required.

Documentation: The suppression provider and land manager will document assessments/decisions on one of the following:

1. Fire Notification Form (new starts)
2. Fire Surveillance Report (ongoing fires)
3. Decision Criteria Record (Alaska Interagency Wildland Fire Management Plan Appendix E)
4. Wildland Fire Implementation Plan (WFIP)
5. Wildland Fire Situation Analysis (WFSA).

Threshold Criteria 3 Regional Impacts:

Smoke concerns are high and require special and sometimes difficult mitigation. Smoke will be readily visible to the public and last several days to weeks. Smoke exposures or amounts at the “*unhealthy*” level are likely to cause health and safety concerns. Large segments of the public are concerned about smoke. Vistas, roads, and residences may experience longer-term decreases in visibility or significant decreases in visibility over the short-term. Major smoke intrusions may occur into smoke sensitive areas, such as hospitals and major airports, at “*unhealthy*” levels and trigger air quality and health concerns. Special coordination with air quality officials is required. Mitigation measures or additional smoke modeling are required to address potential concerns with smoke impacts. Specific smoke monitoring is required to determine smoke plume heights and directions.

Assessment: Upon discovery of a fire, suppression agencies and land managers make an initial assessment of potential impacts. When fires are first discovered, suppression agencies document pertinent fire information including potential smoke impacts on the Fire Notification Form. Those forms are forwarded to land managers. Fire activity and potential impacts including those related to smoke for ongoing fires is documented on fire surveillance reports. This information is summarized and submitted by Zone/Area Dispatch Offices to the Alaska Interagency Coordination Center (AICC) and incorporated daily into the AICC Situation Report. When fires with multiple land ownership cause air quality in a community to reach “*unhealthy*” levels and it is projected to continue or degrade further, land managers should complete additional assessments documentation within 72 hours from detection of “*unhealthy*” conditions. Land managers will follow assessment procedures identified under Threshold 2 and forward those assessments to their AWFCG representative. The AWFCG will evaluate the situation.

Management Action and Responsibility: Convene the AWFCG to evaluate the situation. The AWFCG may implement smoke mitigation actions such as initial attack of fires in a specific geographic area or region regardless of fire management option. AWFCG members are responsible to communicate AWFCG decisions within their agencies. Once air quality improves to “*unhealthy for sensitive groups*” for 72 hours or more, the AWFCG should re-evaluate decisions and on-going actions to determine if decisions and actions remain valid and should continue or if new parameters are needed.

If the Fire Notification Form, Fire surveillance report and/or the land manager’s assessment indicates that the fire is **outside** of any geographic area that the AWFCG has implemented smoke mitigation actions and **no potential** impacts to a community, sensitive areas, or the regional area exist, the fire is managed in accordance with the predetermined fire management option. If Fire Notification Form, Fire surveillance report and/or the land manager’s assessment indicates that the fire is **outside** of any geographic area that the AWFCG has implemented specific smoke mitigation actions and indicates **potential** impacts to a community, sensitive area, or regional area where “*unhealthy*” smoke impacts exist and are projected to continue, the land manager(s) in consultation with the Suppression FMO will determine the appropriate suppression response based on the best available information, including Threshold Criteria level. Existing smoke mitigation actions, regional smoke management issues and potential smoke impacts must be considered if a Decision Criteria Record implements a fire management response different from the predetermined fire management option. If a fire requires a WFSA or the fire is to be managed under a WFIP, potential consequences of the smoke on air quality and the impact of smoke on the public will be considered in developing management alternatives as required in both processes.

Assessments and/or alternative chosen should be reviewed and validated routinely throughout the duration of the fire to ensure that smoke mitigation actions are implemented on a timely basis, if required.

Documentation: The suppression provider and land manager will document the assessments/decisions on one of the following:

1. Fire Notification Form (new starts)
2. Fire Surveillance Report (ongoing fires)
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Air Quality Guidelines				
Visibility Range*	Categories	Monitored Particulate Value (PM2.5, 24 hr. average) **	Health Effects	Cautionary Statements
10 miles and up	Good	0-15	None	None
6 miles to 9 miles	Moderate	16-35	Possibility of aggravation of heart or lung disease among persons with cardiopulmonary disease and the elderly.	None
3 miles to 5 miles	Unhealthy For Sensitive Groups	36-55	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly.	People with respiratory or heart disease, the elderly and children should limit prolonged exertion.
1.5 to 2.5 miles	Unhealthy	56-140	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in the general population.	People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion; everyone else should limit prolonged exertion.
0.9 to 1.4 miles	Very Unhealthy	141-209	Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant risk of respiratory effects in the general population.	People with respiratory or heart disease, the elderly, and children should avoid any outdoor activity; everyone else should avoid prolonged exertion.
0.8 miles or less	Hazardous	>210	Serious aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; serious risk of respiratory effects in the general population.	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly, and children should remain indoors.

* Procedures for making personal observations to estimate visibility

- 1 Face away from the sun
- 2 Look at objects/landmarks that are at known distances.
- 3 Estimate the distance at which the known objects totally disappear

**Updated April 2007 to EPA Proposed AQI